

Taxonomic Study on Some Unrecorded Species of Korean *Hydropus*

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Specimens belonging to the genera *Mycena* and *Collybia* which have been preserved in the herbarium of National Institute of Agricultural Sciences and Technology, Suwon, Korea were investigated. Among them, four species were confirmed to be *Hydropus* species viz *Hydropus marginellus*, *H. nitrata*, *H. erinensis*, and *H. floccipes*. Authors registered them to the Korean mycoflora with full descriptions, illustrations and Korean names.

KEYWORDS: Genus *Hydropus*, *H. erinensis*, *H. floccipes*, *H. marginellus*, *H. nigrita*

Hydropus (Kühn.) Sing. ex Sing. is the genus that belongs to the family *Tricholomataceae* of the *Agaricales*, *Hymenomycetidae*, *Eubasidiomycetes*, *Basidiomycotina*, *Eumycota* (Kirk *et al.*). Most species belonging to *Hydropus* had been recorded in various genera such as *Pseudohiatula*, *Mycenella*, *Collybia*, *Omphalina*, *Mycena*, *Trogia* and *Fayodia* according to the external appearance of the carpophores before a modern system of classification was applied for the *Agaricales*. Kuhn (1938) proposed a natural group of species by reuniting these in the taxon *Hydropus*. However, this taxon was neither validly published nor clearly defined as a genus. The majority of species belonging to *Hydropus* are tropical in the Western and in the Eastern Hemisphere. Many new species belonging to *Hydropus* had been tentatively placed and described in various genera by several authors such as Dennis, Corner and Pegler, etc (Singer, 1982).

Most of these species could be naturally united in the well-defined genus *Hydropus*, tribe *Myceneae*, family *Tricholomataceae* as shown by the literature search of the published papers (Dennis, 1951, 1961, 1970; Corner, 1966; Singer, 1953, 1961, 1975).

Materials and Methods

For the observation of the macroscopic and microscopic features of basidiomes, measurements of the fruitbodies, characters of the pileus, lamellae, stipe and etc. were investigated based on the method of Largent *et al.* (1977). For the measurement of spores ornamentations were excluded, for the basidia sterigmata were excluded and also for the metuloids crystals were excluded. The color terms used were those from Komerup and Wanscher

(1978) and Munsell notation was also referred. For the identification and classification of the genus *Inocybe*, the concept and system of Singer (1987) were applied. The monographs, illustrations and colored illustrations of Alessio (1980), Kuyper (1986), Stangl (1989), Imazeki and Hongo (1987) and the other papers were employed for the detailed comparison of descriptions and identification. All specimens examined are preserved in the National Institute of Agricultural Science and Technology's herbarium.

Descriptions

Genus *Hydropus* (Kühn.) Singer in *Lloydia* 5 : 129. 1942 (num, subnud.) ex Singer, Pap. Mich. Acad. Sci. Arts & Lett. 32: 127. 1946 (Publ. 1948) **맑은대버섯속 (신칭)**
Syn. : *Mycena* subgenus *Eu-Mycena* sect. *Hydropus* Kühner, *Encycl. Mycol.* 10 : 531. 1938 (nom. subnud.); *Fayodia* subg. *Hydropus* (Kühner) Singer, *Ann. Mycol.* 41 : 63. 1943 (nom. subnud.)

Characters : Habit between mycenoid and collybioid, or frequently omphalioid or clitocybioid, rarely pleurotoid; epicutis of pileus consisting of fascicles of noncontinuous subhymeniformly organized which are broad, ventricose, vesiculose, rounded above, frequently pigmented (intracellular pigment, mostly fuscous-gray), in one section (Floccipedes) rare and inconspicuous or replaced by a cutis of very thin-filamentous, often with intracellular pigment, or hyaline; stipe often with a similar covering layer, never viscid; lamellae mostly adnate or decurrent, adnexed to free; hymenophoral trama regular, not gelatinized except in a few species, never bilateral; trama of the carpophores monomitic, often intermixed with numerous inflated and very long cells, with clamp connections, rarely without clamps; conducting elements (oleiferous or laticiferous

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hyphae) often present, context sometimes blackening; latex, if present, aqueous; basidia normal; basidioles not fusoid; spore print white, spores with thin, homogenous, hyaline, inamyloid or amyloid, acyanophilic wall; pleuro- and/or pseudocystidia or metuloids often present; cheilocystidia mostly present; veil generally none or if present, silky and fugacious. Habitat on wood, humus among mosses, on debris.

Development of carphophores : Gymnocarpous in most but monovelagiocarpous in some species

Area : Nearly cosmopolitan but majority of species subtropical and tropical.

Type species : *Hydropus fuliginarius* (Batsch ex Fr.) Sing. sensu Kuhner

Key to sections and subsections of *Hydropus*

1. Epicutis with broad, inflated elements, with or without pigment; pigment mostly intracellular, vacuolar, rarely some incrusting pigment on the epicuticular elements, these either singly or in fascicles or forming an interrupted hymeniform or subhymeniform layer, rarely forming continuous hymeniform layer and then accompanied by thick-walled dermatocystidia which occur likewise on the surface of the stipe; spores always weakly to strongly amyloid; trama of the pileus varying between weakly pseudoamyloid to inamyloid; carpophores often blackening, but also unchanging, if blackening, oleiferous or laticiferous hyphae numerous; clamp connections generally present; pellicle not gelatinous.
 2. Spores amyloid Section *Hydropus*
 3. Carpophores blackening when bruised Subsection *Nigritae*
 3. Carpophores not blackening in any part when bruised Subsection *Marginella*
 2. Spores inamyloid Section *Mycenoides*
 4. Cystidia thin-walled and mostly without any optically differentiated contents, without thickened-wall (i.e. neither pseudocystidia nor metuloids present), or cystidia on the hymenophore absent Subsection *Anthidepades*
 4. Pseudocystidia and/or metuloids present Subsection *Praenses*
 1. Epicutis without or with only sparse inconspicuous dermatocystidia, formed by repent, smooth, filamentous hyphae often filled with vacuolar pigment Section *Floccipedes*
 5. Spores inamyloid Subsection *Floccipedes*
 5. Spores amyloid 6
 6. Pseudocystidia present Subsection *Lipocystides*
 6. Pseudocystidia absent Subsection *Spurii*

(1) *Hydropus nigrita* (Berkeley & Curtis) Singer, Beih. Sydowia 7: 55. 1973. Syn. : *Agaricus fuliginarius* Fr. ㅍ

은대버섯 (신칭)

Macroscopic features

Pileus 7~26 mm broad, hemispherical to convex when young, broadly convex to plane when old, sometimes with a broad umbo in the center, margin acute, projecting beyond lamellae. Surface dry, finely pubescent, grey black when young, somewhat fading in age to beige brown, hygrophanous when dry. Context white when young, later becoming blackish when injured or dry, thin. odor indistinct, taste mild.

Lamellae notched, distant, whitish when young, becoming black when old or touched, lamellae edge smooth, lamellulae.

Stipe 17.5~48.3 × 1.5~3.4 mm, cylindric, somewhat equal, curved, surface finely pubescent, whitish when young, soon grey to finally black. stuffed to hollow in age, fragile. when injured, all fruit body exude a watery fluid and finally turns black.

Microscopic features

Spores 4.5~5.5 × 3.6~5.0 μm, subglobose, smooth, hyaline, inamyloid, spore print white. Basidia 25~30 × 5.0~5.4 μm, with 4-sterigmata, with basal clamp, hymenotrama regular, with brown lactifers in entire fruit bodies. Cheilocystidia 30.4~58.7 × 5.7~10.5 μm, cylindric, fusiform to subulate, thin-walled, hyaline. Pileipellis consists of somewhat parallel hyphae 4.6~13.7 μm across, with light brown pigment, with interspersed dark brown lactifers. Septa with clamp connection.

Edibility : unknown.

Habits & Habitats : Summer to autumn, gregarious on well rotted branches and stumps of conifers. very rare.

Distribution : Korea, Europe. North America.

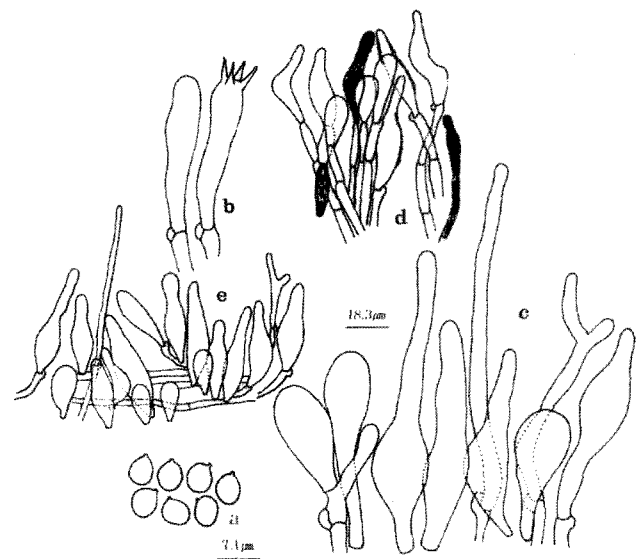


Fig. 1. Microscopic structures of *Hydropus nigrita*. a) basidiospores (×100), b) basidia (×100), c) cheilocystidia (×100), d) pileipellis (×40), e) stipitipellis (×40).

Materials examined : Mt. Youngchi, Yangsan-gun, Kyongsangnam-do, July 3, 1997 (ASIK6324); Mt. Odae, Pyongchang-gun, Kangwon-do, July 14, 1998 (ASIK7108), July 21, 1996 (GBDS3530); Mt. Kwanggyo, Suweon-shi, Kyonggi-do, June 12, 1996 (GBDS3451).

Remarks : This taxon is easy to recognize by the emergence of droplets and immediately turn black when injured, and also could be mistaken for a species of *Lyophyllum* by the blackening of fruiting bodies when injured, but it differs from *Lyophyllum* in lacking siderophilous granules in the basidia.

(2) *Hydropus marginellus* (Pers. : Fr.) Sing. 제주맑은대버섯 (신칭)

Syn.: *Clitocybe umbrino-marginata* Britz.

Macroscopic features

Pileus 4~15 mm broad, campanulate-convex to convex when young, later plane, often with an obtuse umbo, at times slightly depressed around center, margin incurved when young; surface smooth, finely pruinose, translucent-striate when young and wet, when young soot brown, later light brown to grey brown; context membranous; odor indistinct; taste mild.

Lamellae adnexed to subdecurrent, close to subcrowded, whitish; edge pruinose. brownish.

Stipe 8~26 × 2~4(7 in lit.) mm, cylindrical, equal, often bent, surface smooth, finely pruinose, grey brown, hollow.

Microscopic features

Spores 6.0~7.3 × 4.0~4.5 μm, elliptic, smooth, hyaline, amyloid (weak); spore print white. Basidia 24.3~26.1 × 7.0~7.2 μm, with (2)4-spored and basal clamp, with inter-

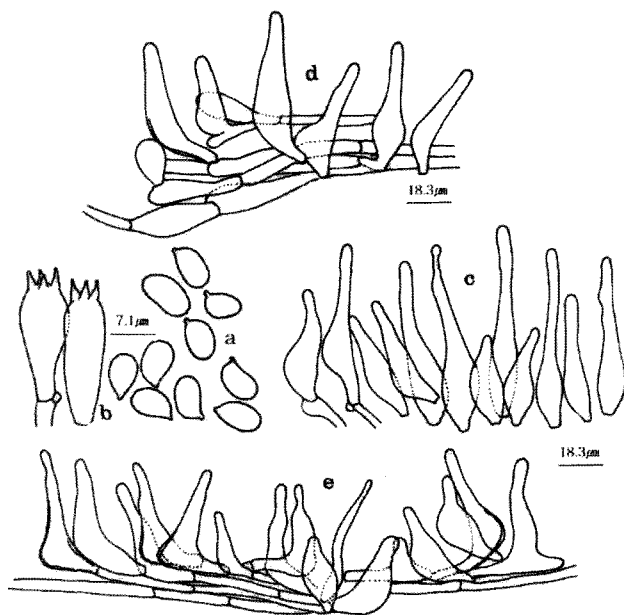


Fig. 2. Microscopic structures of *Hydropus marginellus*. a) basidiospores (×100), b) basidia (×100), c) cheilocystidia (×40), d) pileipellis (×40), e) stipitipellis (×40).

persed lactifers. Hymenophoral trama regular. Cheilocystidia 29.5~70.2 × 11.0~15.9 μm, cylindrical to ventricose or subventricose, flexure, hyaline, thin-walled. Pleurocystidia not seen. Pileipellis consisting of irregular hyphae, with erect, cylindrical, clavate or fusiform, 3.5~14.6 μm across, septa without clamp connection.

Edibility : unknown.

Habits & Habitats : Summer to autumn, solitary or scattered on stumps or well rotted stumps of conifers (*Abies*). very rare.

Distribution : Korea, Europe. North America.

Materials examined : Mt. Halla, Jeju-shi, Jeju-do, July 27, 1996 (ASIK 5950)

Remarks : This taxon is very similar to *Mycena* in its habitat, but it is easily recognized by the pileipellis consisting of dermatocystidioids and with brown edged lamellae. However, the brown color of the edge of lamellae is not always distinct.

(3) *Hydropus erinensis* (Dennis) Singer, Sydowia 6:394. 1962. 잔디맑은대버섯 (신칭)

Syn. : *Collybia erinensis* Dennis, Trans. Brit. Mycol. Soc. 34: 455. 1951.

Macroscopic features

Pileus 7~23 mm broad, hemispherical to convex or sometimes with umbo at center when young, broadly convex to nearly plane when old, sometimes with a darker umbo in the center, margin acute, surface dry, finely pruinose, brick red (7D6-7), brown (7E7-8), reddish brown (8D-E6-8) or garnet brown (9D7-8) to cuba (9E8) when young, light brown (6C6-7) to (6D7-8), or brick red (7D6-7), brown (7E7-8), reddish brown (8D-E6-8), somewhat fading in age, prominently translucent striates except center when wet, hygrophanous when dry. context thin, concolorous with surface, unchanging when injured or dry, odor indistinct; taste mild.

Lamellae adnexed, distant to subclose (L = 14~16, l = usually 2-tiers, rarely 1-tiers), whitish when young, lamellae edge smooth.

Stipe 22.5~54.5 × 1.5~3.5 mm, cylindrical, somewhat equal, curved, surface dry, finely pruinose, orange white (5A2) to greyish yellow (4B-C4) towards apex, concolorous with pileus or darker downwards. hollow in age, fragile.

Microscopic features

Spores 7.4~7.8 × 5.2~5.7 μm, ellipsoid to ovoid, smooth, thin-walled, hyaline. strongly amyloid, spore print white. Basidia 35~37 × 7.8~8.0 μm, clavate, often constrict, with 4-sterigmata, with basal clamp, hymenophoral trama regular. Cheilocystidia 26.4~53 × 15.4~17.6 μm, ampullaceous to clavate, thin-walled, hyaline. Pleurocystidia absent. Pileipellis consists of somewhat parallel hyphae 4.5~8.4 μm across, with terminal cells being of mostly single somewhat scattered ampullaceous, clavate, thin-walled, hyaline, 37.4~85.8 × 15.2~22 μm, light brown pigment, hyphal

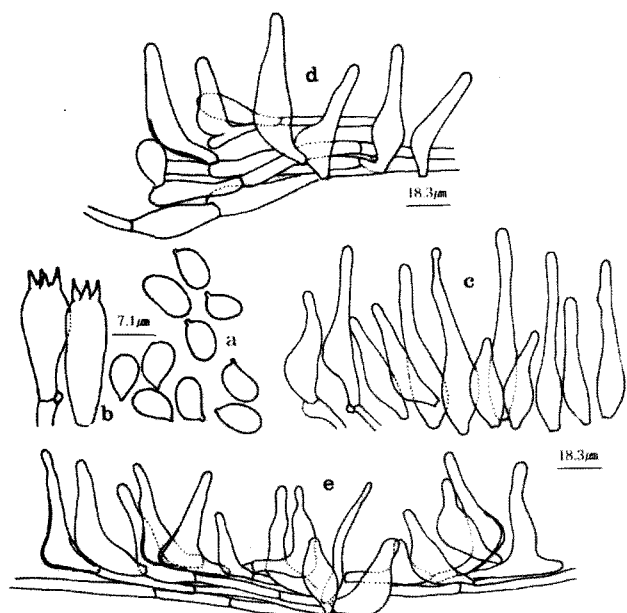


Fig. 3. Microscopic structures of *Hydropus erinensis*. a) basidiospores ($\times 100$), b) basidia ($\times 100$), c) cheilocystidia ($\times 40$), d) pileipellis ($\times 40$), e) stiptipellis ($\times 40$).

septa with clamp connection. Caulocystidia $68.2\text{--}94.6 \times 12.1\text{--}16.5 \mu\text{m}$. sublageniform, subulate to subcylindric, thin-walled, hyaline, often bundle.

Edibility : unknown.

Habits & Habitats : Summer to autumn, gregarious on well rotted branches and stumps of conifers. very rare.

Distribution : Korea, South America.

Materials examined : RDA, Suwon-shi, Kyonggi-do, Aug. 10, 1998 (ASIK 7335)

Remarks : This taxon is easy to recognize by the emergence of droplets and immediately turn black when injured, and also could be mistaken for a species of *Lyophyllum* by the blackening of fruiting bodies when injured, but it differs from *Lyophyllum* in lacking siderophilous granules in the basidia.

(4) *Hydropus floccipes* (Fries) Singer in *Sydowia* 15: 66.1961. **솜털맑은대버섯 (신칭)**

Syn. : *Agaricus floccipes* Fries, *Epicrisis Systematis Mycologici* p. 87. 1838

Mycena floccipes (Fries)Kuhner, *Encycl. Mycol.* 10:540. 1934

Macroscopic features

Pileus 6~27 mm broad, subconic, campanulate to hemispheric when young, later becoming convex, broadly convex to convex-expanded sometimes with umbonate or obtuse at center, margin acute, not incurved, surface dry, smooth, greyish brown (8C-D3-4) towards center, haired brown to caramel red (6C4-6) or paler towards margin, finely whitish pruinose, not viscid, not hygrophanous, context thin, concolorous with surface, unchanging when

injured or dry; odor indistinct; taste mild.

Lamellae adnexed, distant to subclose ($L = 14\text{--}16$, $l =$ usually 2-tiers, rarely 1-tiers), whitish when young, lamellae edge smooth.

Stipe $20.5\text{--}60.5 \times 1\text{--}3.5 \mu\text{m}$, cylindric, somewhat equal, straight or flexuous, surface dry, whitish, to pale greyish brown, or orange white (5A2) or paler than pileus, with finely white pruinose, whitish hairy at the base, somewhat darker downwards, hollow, fragile.

Microscopic features

Spores $5.7\text{--}7 \times 5.7\text{--}7 \mu\text{m}$. globose to subglobose, smooth, thin-walled, hyaline, hilar appendage not seen, inamyloid, spore print white. Basidia $25.4\text{--}30 \times 5.6\text{--}7.2 \mu\text{m}$, clavate, often constrict, with 4-sterigmata, with basal clamp, hymenophoral trama regular. Cheilocystidia $22.5\text{--}94.2 \times 6.7\text{--}22.7 \mu\text{m}$, dimorphic, ampullaceous to clavate, or sublageniform to subcylindric, thin-walled, hyaline. Pleurocystidia $37.4\text{--}103.4 \times 13.2\text{--}16.5 \mu\text{m}$, ventricose, sublageniform to subcylindric, usually round to obtuse apex, thin-walled or slightly thick-walled, sometimes with hyaline mucous substrates which maybe attached to spores, hyaline. Pileipellis consists of cutis-layer which is not gelatinized, somewhat parallel hyphae $4.6\text{--}7.5 \mu\text{m}$ across, dermatocystidia inconspicuous or a few ones, mostly single or somewhat scattered, more or less subcylindric to sublageniform, flexure, thin-walled, hyaline, $30.8\text{--}44 \times 6.6\text{--}9 \mu\text{m}$, intraparietal pigment, pale brown to brownish fuscus, hyphae filamentous with clamp connection. inamyloid to slightly pseudoamyloid in both pileus and stipe, caulocystidia $33\text{--}77.5 \times 12.2\text{--}25.3 \mu\text{m}$. sublageniform, subventricose, subulate to subcylindric, thin-walled, intraparietal pigment, brown, with basal clamp, often bundle.

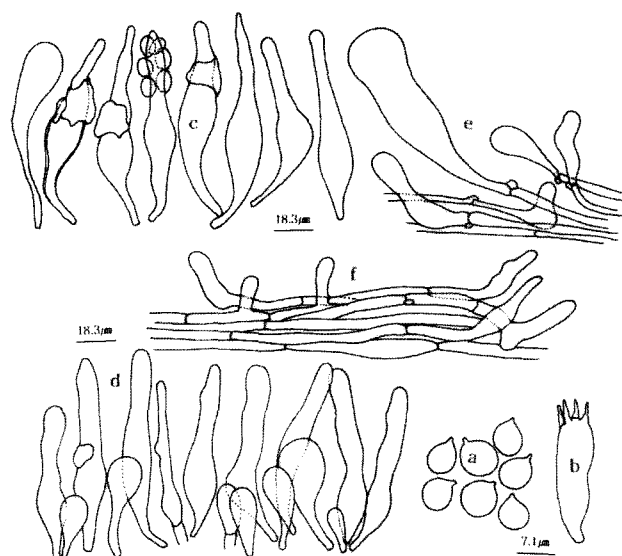


Fig. 4. Microscopic structures of *Hydropus floccipes*. a) basidiospores ($\times 100$), b) basidia ($\times 100$), c) pleurocystidia ($\times 40$), d) cheilocystidia ($\times 40$), e) pileipellis ($\times 40$), f) stiptipellis ($\times 40$).



Fig. 5. Macroscopic features of *H. nigrita*, A-B; *H. maginellus*, C; *H. erinensis*, D; *H. floccipes*, E.

Edibility : unknown.

Habits & Habitats : Summer to autumn, gregarious on bark of trunks and stumps of dead conifers, very rare.

Distribution : Korea, Northern and Southern temperate zones of the Eastern and Western Hemisphere.

Materials examined : Mt. Chiak, wonju-gun, Kangwon Province, July 15, 1992 (ASIK 4493); Mt. Songni, Poun-gun, Chungbuk Province, July 13, 2002 (ASIK10108)

Remarks : This taxon is easy to recognize by epicutis never fragmentarily subhymeniform and dermatocystidia, spores globose, inamyloid, lamellae adnate to adnexed,

never decurrent and stipe with densely greyish scabrous or dotted.

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